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# DEFENSE RESEARCH LABORATORY THE UNIVERSITY OF TEXAS

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TRO-66-27  
21 April 1966  
LAJ:ph

From: Supervisor, Psychoacoustics Section

To: Office of Grants and Research Contracts  
Office of Space Science and Applications  
National Aeronautics and Space Administration  
Washington, D. C. 20546  
Attn: Code SC

Subj: Contract Nonr-3579(04), Seventh Quarterly Progress Report  
(1 December 1965 through 28 February 1966), Transmittal of

Encl: Seventh Quarterly Progress Report on Contract Nonr-3579(04)

Defense Research Laboratory is pleased to submit the enclosure as a report of progress made during the period 1 December 1965 through 28 February 1966 on Contract Nonr-3579(04).

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**N66-235 23**

(ACCESSION NUMBER)

(THRU)

9  
(PAGES)

05  
(CODE)

CR-74424  
(NASA CR OR TMX OR AD NUMBER)

05  
(CATEGORY)

GPO PRICE \$ \_\_\_\_\_

CFSTI PRICE(S) \$ \_\_\_\_\_

Hard copy (HC) 1.00

Microfiche (MF) .50

21 April 1966

LAJ:ph

Copy No. 6

Report for Contract Nonr-3579(04)  
for the period 1 December 1965 through 28 February 1966  
Supported by Contract R-129-09-030-017 with the National Aeronautics  
and Space Administration

Status of Proposed Problems

A. Vigilance Studies  
(C. S. Watson and T. L. Nichols)

Work on this problem has been completed, and the results are being prepared for publication and issuance as a report under the present grant.

In the course of the study a modified version of Egan's "Method of Free Response" was developed and employed in the experiment. The type of detection performance exhibited by the subjects when the stimulus occurred infrequently and without warning was simulated rather closely using an electrical model of the hearing mechanism.

A paper describing both experiments will be presented at the June meeting of the Acoustical Society of America.

B. Psychophysical Studies of Brightness: Effects of Adaptation on the  
Brightness of Positive and Negative Flashes of Light  
(G. H. Jacobs and H. A. Gaylord)

Data have now been collected in three variations of an experiment designed to assess the effects of adaptation on the brightness of flashed incremental and decremental stimuli. Analysis of data from 25 subjects obtained under four adaptation conditions is currently underway. We are particularly interested in examining the dependence of the slope of the brightness function upon adaptation condition--preliminary analysis indicates that the slope of the obtained functions are considerably steeper than those reported previously. Data have also been obtained for two other conditions where the magnitude of

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the luminance change is of interest. In one, 10 subjects generated brightness functions for large changes in stimulus luminance. In the other variant, luminance was shifted in small steps in the vicinity of the adaptation luminance. Analysis of these two phases has just begun.

C. Signal Detection and the Width of Critical Bands  
(L. A. Jeffress)

Work on this problem with human observers continues to be deferred because we have been using the filters with the electrical ear model instead. By delimiting the problem through the use of the model, we hope to make more efficient use of subjects when we do undertake the study.

D. Psychometric Functions for an Ear Model: Effect of Duration  
(L. A. Jeffress and A. D. Gaston)

The filter combination described in the Sixth Quarterly Status Report has been employed to obtain a series of psychometric functions. It is created, as we believe the ear creates its bandpass characteristics, by combining low-pass filters. The present filter consists of two low-pass filters with sharp high-frequency cutoffs, driven in parallel with the lower one (500 Hz) subtracted from the higher (525 Hz). The resulting response curve shows a sharp peak at 500 Hz, a sharp skirt on the high-frequency side, and a considerably broader skirt on the low-frequency side. The shape rather closely resembles that of the single-cell responses reported years ago for units of the cochlear nucleus by Galambos and Davis.

The attempt, described in the last Quarterly Status Report, to replicate the relation between detection and signal duration found by Green, Birdsall, and Tanner has finally proved successful. Using the filter described above and following it with a linear detector having a 100-msec decay constant, we were able to fit the average for the four subjects employed by Green, Birdsall, and Tanner, better than the individual subjects fit their averages.

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UNDER CONTRACT Nonr-3579(04)

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